Drainage and Tillage Effect on Corn Production

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Objective
To evaluate the effect of soil drainage and tillage on corn production.

Background

Cooperator: O.A.R.D.C. NW Branch
County: Wood
Nearest Town: Hoytville
Drainage: see below
Soil type: Hoytville, clay
Tillage: see below
Previous Crop: soybean
Variety: Pioneer 35F44
Fertilizer: 150 # 18-46-0, sidedress 28% N @ 50 Gal/ac
Planting Date: 5-11-09
Planting Rate: 30,000
Row Width: 30 in
Herbicides: Lexar, Showdown, 2,4-D, Simazine 4L, post Roundup, Weathermax, AMS
Harvest Date: 10-29-09

Methods

The entries were replicated eight times in a randomized complete block design. Plot size was 10 feet x 60 feet for each entry. Harvest data collected from center rows. The same crop was planted on all treatments on the same day, using the same variety, fertility, and herbicide.

Drained plots have subsurface tile drainage compared to undrained plots which do not have subsurface drainage. Both sets of drainage plots contain four identical tillage treatments.
1. Continuous no-till
2. Fall Strip Tillage – a 6 in deep mole knife with mounding coulters
3. Fall Zone Tillage – a 12 to 18 inch deep straight shank subsoiler, no further tillage
4. Fall moldboard plow – followed by fall roterra finish tillage

Results

<table>
<thead>
<tr>
<th>2009 Corn Yields</th>
<th>Tillage</th>
<th>Yield (bu/ac)</th>
<th>LSD (0.05)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drainage</td>
<td>No-till</td>
<td>175.7</td>
<td>NS</td>
</tr>
<tr>
<td>Undrained</td>
<td>No-till</td>
<td>167.0</td>
<td></td>
</tr>
<tr>
<td>Drainage</td>
<td>Strip-till</td>
<td>172.7 A</td>
<td>14.1</td>
</tr>
<tr>
<td>Undrained</td>
<td>Strip-till</td>
<td>156.0 B</td>
<td></td>
</tr>
<tr>
<td>Drainage</td>
<td>Zone-till</td>
<td>175.0 A</td>
<td>5.0</td>
</tr>
<tr>
<td>Undrained</td>
<td>Zone-till</td>
<td>158.1 B</td>
<td></td>
</tr>
<tr>
<td>Drainage</td>
<td>Plow</td>
<td>168.3</td>
<td>NS</td>
</tr>
<tr>
<td>Undrained</td>
<td>Plow</td>
<td>166.3</td>
<td></td>
</tr>
</tbody>
</table>
Summary

This experiment has been conducted for over 20 years. In 2009 corn yield was significantly better with drainage in the Strip-till and Zone-till treatments compared to undrained. After long-term no-till, soil structure may have allowed soil drainage to be nearly equal regardless of tile drainage. The undrained plow treatments allowed the top 8 inches of soil to also have a loose soil structure which enhances drainage.

Within the same drainage plot, tillage was not a significant factor.

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